THE UNDERGRADUATE MATHEMATICS CLUB OF THE UNIVERSITY OF WASHINGTON, Seattle, Washington.

The information given below concerning this club was furnished by Assistant Professor Eric T. Bell of the University of Washington.

The club was in existence for some ten years and had a membership of about twenty-five. Meetings were held twice a month with an average attendance of about fifteen. The outbreak of the war put an end to the club's activities, since all but two of its members were taken in the draft or in other service. The club is soon to be reorganized.

The club was managed entirely by the students without any interference or direction whatever from the faculty and the results amply justified this course. Members of the faculty were invited to attend the meetings of the club and occasionally did so. On rare occasions, when the students had not had time to prepare papers of their own, they asked a member of the faculty to give an account of some branch of mathematics not in the undergraduate courses; for example, mathematical crystallography, groups, higher arithmetic, applications of mathematics to biology, etc. Meetings were scheduled to last for an hour and a half to two hours but sometimes continued for as long as three hours.

Detailed information concerning programs is lacking since the records kept by the secretaries disappeared when the last secretary left the university at the outbreak of the war. Some of the programs given, however, were as follows.

"Ten British mathematicians." A review of Alexander Macfarlane's book (1916) of that title—"Non-euclidean geometry." Presented and discussed at several meetings by members who had studied the subject. Bonola's (1912) and Manning's (1901) books were used as sources—"Geometry of four dimensions." A presentation during several meetings of Manning's book (1914) and a sketch of the circle-representation as given in Weber-Wellstein (1905)—"Hilbert's proof of the transcendence of π"—"Continued fractions and 'Pell's equation'"—"Formal implication."

PROBLEMS AND SOLUTIONS.

EDITED BY B. F. FINKEL AND OTTO DUNKEL.

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PROBLEMS FOR SOLUTION.

2762. Proposed by N. P. PANDYA, Amreli, India.

$ABCD$ is a cyclic quadrilateral inscribed in an ellipse. $AB = 2BC$ and $CD = 2DA$. Find the eccentricity of the ellipse in terms of the sides of the quadrilateral.

2763. Proposed by C. N. SCHMALL, New York City.

Show that the equation, $ky - 2k^{1/3}a^{2/3}x + x^2 = 0$, where k is a variable parameter, represents a family of parabolas passing through a fixed point, and all having the same areas, comprised between the curve and the x-axis.

Show, also, that the envelope of the family is the rectangular hyperbola whose equation is $xy = 2^5a^2/3^3$.

2740. Proposed by E. H. CLARKE, Hiram College.

If the coefficients of $(a - b)^k$ (where k is a positive integer) be multiplied term by term by the nth powers (n being zero or a positive integer), of the terms of any arithmetic progression with common difference $d \neq 0$, the sum of the products will vanish if $n < k$; will be $(-d)^k(k!)$ if $n = k$; and, if $n = k + 1$, will be the product of this last result and the sum of the terms of the arithmetic progression.

2765. Proposed by A. M. HARDING, University of Arkansas.

ABC is an equilateral triangle. A point D is taken in BC such that BD is $1/3$ of BC and E is taken in CA such that CE is $1/3$ of CA. If the lines AD and BE intersect at O, show that OC is perpendicular to AD.

2766. Proposed by N. P. PANDYA, Amreli, India.

Is it possible to find a harmonic series whose terms are positive integers such that the product of the first, second, seventh, and eighth terms is equal to the product of the third, fourth, fifth, and sixth terms?

2767. Proposed by W. W. JOHNSON, U. S. Naval Academy.

Let the complex quantities p, q, and r satisfy the relation $p^2 + q^2 + r^2 = 0$; prove that the corresponding vectors OP, OQ, and OR are such that if any two of them are taken as conjugate semi-diameters of an ellipse, the third lies on the minor axis and its length is the distance from the center to either focus.

2768. Proposed by PAUL CAPRON, U. S. Naval Academy.

Given the center, a focus, and a point of a conic, construct geometrically the circle of curvature at the point.

2769. Proposed by B. J. BROWN, Kansas City, Mo.

Expand in powers of x as far as x^2 the function $\dfrac{\cosh \lambda x}{\cosh \lambda} - \dfrac{x \sinh \lambda x}{\sinh \lambda}$, in which λ is a positive constant.

Prove that, if $\lambda \tanh \lambda > 2$, the function has only one maximum value for $x > 0$ and that the value of x for which the maximum occurs is less than 1. India Civil Service. 1912.

2770. Proposed by A. M. HARDING, University of Arkansas.

Solve the differential equation

$$\frac{d^3x}{dt^3} - 2(\mu t + \lambda)\frac{dx}{dt} + (1 - \mu)x = 0,$$

where λ and μ are constants.

2771. Proposed by GEORGE PAASWELL, New York City.

A circle is revolved through an angle of 90° about a vertical chord which does not pass through the center of the circle. Taking the origin at the lower extremity of the chord, the z-axis along the chord, and the x- and y-axes in the boundary planes, pass a plane through the x-axis making a given angle with the xy-plane. Determine the portion of the area of the surface above the plane and between the xz- and yz-planes.

NOTE.—This is a restatement of calculus problem 430, a solution of which appeared in this MONTHLY, February, 1913. As the solution there given is not according to the interpretation intended by the Proposer, we are reprinting the problem in this slightly revised form—EDITORS.

2772. Proposed by HARRY LANGMAN, New York City.

Given $1 = (-\tfrac{1}{2} + x)^r = (-\tfrac{1}{2} - x)^r$, where r is an integer. Prove that r is a multiple of 3. In general, if

$$1 = \left(\cos\frac{2\pi}{m} + x\right)^r = \left(\cos\frac{2\pi}{m} - x\right)^r,$$

where r and m are integers, prove that r is a multiple of m.